Beef industry can reduce emissions by up to 30%, says new research
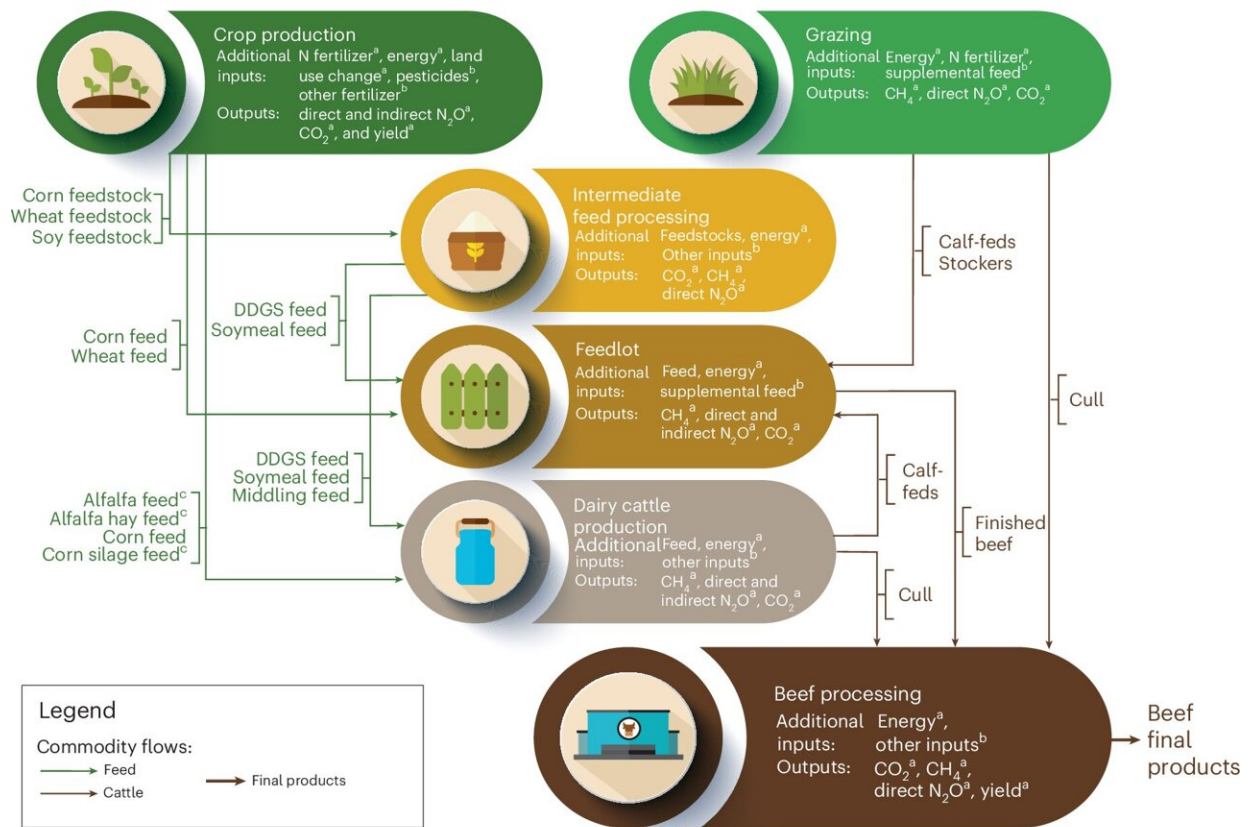
September 3 2024

Modeled US beef LCA. Stages, flows, system boundaries and spatial resolution of the US beef LCA. LCA parameters: [a]spatially explicit parameters, [b]US averages, [c]yields and land use change are spatially explicit; all the other inputs and outputs are based on US average data. Credit: *Nature Food* (2024). DOI:

Greenhouse gases resulting from human activity have been the largest driver of climate change since the mid-20th century—especially from agriculture. The U.S. beef industry alone is responsible for 3.3% of the nation's total emissions, and even with greater reduction commitments among beef industry partners and meaningful gains over the past 50 years, the highly complex supply chain remains a barrier.

New research published in *Nature Food*, from the University of Minnesota's Institute on the Environment (IonE) and The Nature Conservancy, outlines actionable steps the U.S. beef industry can take to reduce greenhouse gas emissions by up to 30%. Rylie Pelton, lead author and research scientist with IonE, and fellow researchers developed and applied the first county-level, location-specific assessment of the beef industry's environmental impact, which identified geographic emission hotspots along the supply chain.

The research found:

- The U.S. beef industry currently emits nearly 258 million metric tons of greenhouse gases each year.
- Emissions from feed production associated with beef sourcing and confinement, such as feedlots, are concentrated in the Great Plains and Midwest, while emissions from grazing tend to be more evenly distributed across the West.
- Nearly a third of greenhouse gas emissions could be mitigated through the implementation of alternative practices in grazing, feed production, confinement and processing. 42 alternative practices were investigated across the supply chain, including strategies such as cover cropping, feed additives and energy

management.

"The beef supply chain is one of the country's most intricate food production systems, making it difficult for beef processors to identify opportunities for reducing their emissions," said Pelton. "Our highly-tailored assessment offers distinct recommendations for different parts of the country, including concrete steps the beef industry can take to reduce their greenhouse gas emissions and increase the carbon sequestration in soils and working lands."

Through the assessment, researchers outlined immediate action the beef industry can take to begin reducing greenhouse gas emissions based on regional geographic characteristics and accessible mitigation strategies. For example, Pelton and her team identified a significant opportunity to add trees to pasturelands in the Southeast to store more carbon in grazing areas. In the Northern Great Plains, the team found potential benefits in repairing degraded wetland areas to achieve the same result.

"Sustainability needs to be business-as-usual in the U.S. beef industry to ensure stable, long-term food production and economic security for ranchers and their communities as well as a healthy environment for us all," said Kris Johnson, co-author and director of The Nature Conservancy's North America Agriculture program. "This research helps the industry and other decisionmakers identify actionable steps to achieve climate targets while delivering a product that meets consumer expectations."

The research also represents an expansion of IonE's FoodS3 model, pronounced "foods cubed," which analyzes the sustainability of food industry supply chains to provide actionable recommendations for reducing environmental impact.

"These are our first published results that feature location-specific data

on emissions in the animal stage of the [supply chain](#)," said Jennifer Schmitt, FoodS3 research lead and co-author of the paper. "We are excited to share how our model can bring increased transparency to U.S. agricultural supply chains and identify steps companies and industry can take to reduce their carbon footprint."

More information: Rylie E. O. Pelton et al, Greenhouse gas emissions in US beef production can be reduced by up to 30% with the adoption of selected mitigation measures, *Nature Food* (2024). [DOI: 10.1038/s43016-024-01031-9](#)

Provided by University of Minnesota